MULTIMEDIA UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

# FINAL EXAMINATION

**TRIMESTER 2, 2022/2023**

## BOM2064 – QUALITY AND OPERATIONS MANAGEMENT

(All sections/Groups)

3 JULY 2023
9.00a.m – 11.00a.m
(2 Hours)

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## INSTRUCTIONS TO STUDENT

1. This question paper consists of 5 pages.
2. Attempt **ALL** questions. The distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.

**ANSWER ALL THE QUESTIONS.**

## QUESTION 1

(a) Discuss **THREE (3)** key differences between a good and a service. (12 marks)

(b) Why the measurement of productivity in the service sector is relatively difficult compared to the manufacturing sector? (5 marks)

(c) Good Wheels manufactures Go-Kart tires. It makes 1,000 tires per day with the following resources:

| | |
|---|---|
| Labor: | 400 hours per day @ RM12.50 per hour |
| Raw material: | 20,000 pounds per day @ RM1.00 per pound |
| Energy: | RM5,000 per day |
| Capital costs: | RM10,000 per day |

i) What is the multifactor productivity for the production of these tires at Good Wheels? (Write your answer in nearest three decimal places) (3 marks)

ii) What is the percentage change in multifactor productivity if Good Wheels can reduce the energy bill by RM1,000 per day without cutting production or changing any other inputs? (Write your answer in nearest three decimal places) (5 marks)

[Total: 25 marks]

## QUESTION 2

(a) At Hard Rock's Malacca restaurant, the manager is trying to evaluate how a new advertising campaign affects guest counts. The data are shown in Table 1:

Table 1

| Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Guest Count (in thousand) | 21 | 24 | 27 | 32 | 29 | 37 | 43 | 43 | 54 | 66 |
| Advertising (in RM thousand) | 14 | 17 | 25 | 25 | 35 | 35 | 45 | 50 | 60 | 60 |

i) Using data for the past 10 months (refer to Table 1), develop a least squares regression relationship. (Write your answer in nearest two decimal places) (10 marks)

ii) Forecast the expected guest count when advertising is RM65,000. (2 marks)

**Continued ...**

(b) Explain the three difference types of quality in Kano Model: basic quality, performance quality and excitement quality. (6 marks)

(c) Table 2 shows the causes of poor grades on an exam. Perform the Pareto analyses to determine the issues that students must look into, in order to improve their exam grades in the future.

Table 2

| Reason for Poor Grade | Frequency |
|---|---|
| Insufficient time to complete | 15 |
| Late arrival to exam | 8 |
| Difficulty understanding material | 25 |
| Insufficient preparation time | 2 |
| Studied wrong material | 2 |
| Forgot exam was scheduled | 3 |
| Felt ill during exam | 5 |

(7 marks)
[Total: 25 marks]

## QUESTION 3

(a) Sveeshal Co. data gives readings of 10 samples of size 6 each in the production of a certain product. Calculate the UCL and LCL for both mean and range. Determine whether the process is in control. (Write your answer in nearest two decimal places)

| **Sample** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Mean** | 383 | 508 | 505 | 582 | 557 | 337 | 514 | 614 | 707 | 753 |
| **Range** | 95 | 128 | 100 | 91 | 68 | 65 | 148 | 28 | 37 | 80 |

(10 marks)

(b) Illustrate (in a diagram) the various parties involved in the supply chain for a:

(i) manufacturing company (3.5 marks)

(ii) service-based company (3.5 marks)

(c) Discuss **FOUR (4)** benefits of effective supply chain management. (8 marks)
[Total: 25 marks]

**Continued ...**

## QUESTION 4

(a) Explain the **FOUR (4)** types of inventories that a manufacturing company typically carries. (8 marks)

(b) A retail store sells an average of 500 units of a product per week. The lead time for the product is 14 days and the store wants to maintain a safety stock of 100 units. What is the reorder point for this product? (4 marks)

(c) Discuss **FOUR (4)** points on Kaizen philosophy. (8 marks)

(d) A manufacturing company uses kanban cards to control production and movement of parts. One work center uses an average of 60 units per hour of a certain part. Standard containers hold 20 units. The cycle time is 30 minutes. Management has assigned an inefficiency factor of 0.30 to this work center. How many containers should be used to support this operation? (5 marks)

[Total: 25 marks]

**Continued ...**

## RELEVANT EQUATIONS/FORMULAE

1) CL = $\overline{\overline{X}}$

UCL, LCL (X – bar) = $\overline{\overline{X}} \pm A_2 \overline{R}$

UCL ( R) = $D_4 \overline{R}$

LCL ( R) = $D_3 \overline{R}$

Table for X – bar & R Charts

| No of Observation In sub group n | A2 | D3 | D4 |
|---|---|---|---|
| 2 | 1.88 | 0 | 3.27 |
| 3 | 1.02 | 0 | 2.57 |
| 4 | 0.73 | 0 | 2.28 |
| 5 | 0.58 | 0 | 2.11 |
| 6 | 0.48 | 0 | 2.00 |

2) UCL c = $\bar{c} + 3\sqrt{\bar{c}}$

LCL c = $\bar{c} - 3\sqrt{\bar{c}}$

3) $\bar{p}$ = Total No of Defective from All Samples/ (No of Samples X Sample Size)

$Sp = \sqrt{[\bar{p}(1 - \bar{p})/n]}$

CL = $\bar{p}$

LCL = $\bar{p} - 3\,Sp$

UCL = $\bar{p} + 3\,Sp$

4) Capacity Utilization = Capacity Used / Best Operating Level

5) $$r = \frac{n\sum XY - [\sum X \sum Y]}{\sqrt{\left[n\sum X^2 - (\sum X)^2\right]\left[n\sum Y^2 - (\sum Y)^2\right]}}$$

$$a = \overline{Y} - b\overline{X}$$

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2}$$

6) Exponential smoothing

Forecast for the month $t$: $F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$

**Continued ...**

7) Inventory Management:

$$\text{EOQ} = Q^* = \sqrt{\frac{2DS}{H}} \qquad TC = \frac{Q}{2}H + \frac{D}{Q}S$$

$$\text{EPQ} = Q_0 = \sqrt{\frac{2DS}{H}}\sqrt{\frac{p}{p-u}} \qquad I_{\max} = \frac{Q}{P}(p-u) \qquad TC = \frac{I_{\max}}{2}\text{H} + \frac{\text{D}}{\text{Q}}\text{S}$$

$$SS = z\,(\sigma\text{d})\sqrt{LT} \qquad ROP = \bar{\text{d}}\,(LT) + z(\sigma\text{d})\sqrt{LT}$$

8) Lean Operations:

$$N = \frac{DT(1+X)}{C}$$

**End of Paper**